

**REMARKS**

Claims 1 and 4 are pending.

Figures 1 and 2 have been amended to show the legend “Prior Art”.

**OBJECTIONS TO THE DRAWINGS**

The Examiner objects to the drawings on the ground that Figures 1 and 2 should be designated by a legend such as “Prior Art”.

Claims 1 and 2 have been amended to show the legend “Prior Art,” in accordance with the Examiner’s much appreciated suggestion. Hence, it is submitted that the drawings pass muster under MPEP § 608.02(g).

**REJECTIONS UNDER 35 U.S.C. § 112, ¶2**

The Examiner rejects Claims 1 and 4 on the ground of being indefinite.

As to Claim 1, the Examiner asks for clarification regarding “an angle of substantially 90°, but less than 90°”. The Examiner takes the position that “according to Figures 3 and 4, the cylindrical end face on an inner side of the ceramic tube forms an angle about 50° that can’t be interpreted as ‘substantially 90°’ and therefore the limitation ‘substantially 90°, but less than 90°’ is vague.”

Where the disclosure gives no indication that the drawings were drawn to scale, “it is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.” *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956, 55 USPQ2d 1487, 1491 (Fed. Cir. 2000). The present Application does not state that the drawings “are to scale”. Figures 3 and 4 are not intended to show the precise proportions of the ceramic tube 3, the cylindrical end face 11' and the bevel 12'. Hence, Figures 3 and 4 are not intended to show the precise recited angle of Claim 1, other than the fact that the angle is clearly less than 90°.

Moreover, expressions such as “substantially” in patent claims have been recognized by the United States Supreme Court as being sufficiently particular. The fact that “substantially” is a relative term does not inherently make a claim indefinite is well settled in the law. *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 US 45, 66 (1923); *Arnold Pipe Rentals Co. v. Engineering Enterprises, Inc.*, 146 USPQ 415, 421, 422 (5th Cir. 1965); *Andrew Corp. v. Gabriel Electronics, Inc.*, 6 USPQ 2d 2010, 2012-14 (Fed. Cir. 1998).

Furthermore, it is noted that the Examiner does not object to the specification regarding the recited “angle of substantially 90°, but less than 90°”.

In the Examiner's Response to Arguments (Office Action, page 6, second paragraph), the Examiner states that the specification fails to specify any range of angle that can be used to interpret the limitation "substantially 90°". Here, it is noted that the recital of Claim 1 is "an angle of substantially 90°, but less than 90°". It is submitted that one of ordinary skill in the art would know what is meant by "an angle of substantially 90°". See *Andrew Corp. v. Gabriel Electronics*, 847 F.2d 819, 6 USPQ2d 2010, 2013, 2014 (Fed. Cir. 1988). The same is true where the additional recital of "but less than 90°" has been added. One of ordinary skill in the art would clearly understand that this expressly eliminates any angles that are equal to or greater than 90°.

Therefore, for the above reasons, it is submitted that Claim 1 is definite and passes muster under Section 112, second paragraph.

Claim 4 depends from Claim 1 and is definite and passes muster under Section 112, second paragraph, for the same reasons.

#### **REJECTIONS UNDER 35 U.S.C. § 102(b)**

The Examiner rejects Claims 1 and 4 on the ground of being anticipated by U.S. Patent No. 4,962,289 (Stegmüller), or U.S. Patent No. 4,445,016 (Sinnecker), or DE 9205493U (Siemens AG).

As to each of Stegmüller (Office Action, page 4, line 2), Sinnecker (Office Action, page 4, last line) and Siemens AG (Office Action, page 5, line 19) the Examiner states that these patents disclose "an angle of substantially 90°".<sup>1</sup> This statement is respectfully traversed.

It is respectfully submitted that each of these three cited references, whether taken alone or in combination, does not teach or suggest an angle of *less than 90°*.

In the Examiner's Response to Arguments (Office Action, page 6, second paragraph), it appears that the Examiner does not consider Applicants' remarks and claim recital in connection with the rejection under Section 102(b) on the ground that the recital "an angle of substantially 90°, but less than 90°" is vague under Section 112, second paragraph.

As set forth in MPEP § 2143.03 (*emphasis added*):

A claim limitation which is considered indefinite cannot be disregarded. If a claim is subject to more than one interpretation, at least one of which would render the claim unpatentable over the

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<sup>1</sup> As to former Claims 3, 5 and 7, for each of the three references, the Examiner previously took the contradictory view (Office Action mailed on June 14, 2005, pages 4, 5 and 6) that the angle is "at least 90°". It is submitted that the only way to reconcile these contradictory views is to make the angle equal to 90°.

prior art, the examiner should reject the claim as indefinite under 35 U.S.C. 112, second paragraph (see MPEP § 706.03(d)) and should reject the claim over the prior art ***based on the interpretation of the claim that renders the prior art applicable.***

The Examiner argues that Figures 3 and 4 show an angle of about 50°. Even if Claim 1 were subject to the Examiner's interpretation, although this is not admitted in view of the express recital of "an angle of substantially 90°," it is submitted that the Examiner does not reject Claim 1 over the prior art of record based on the Examiner's interpretation of Claim 1. The prior art does not teach or suggest (under the Examiner's interpretation) an angle of about 50° or the recited angle of substantially 90°, ***but less than 90°.***

Applicants have dealt with the rejection under Section 112, second paragraph, above. It is submitted that none of the references, whether taken alone or in combination, teaches or suggests a ceramic tube, wherein at the triple junction of metal end cap, ceramic tube and vacuum chamber, a cylindrical end face on an inner side of such ceramic tube forms an angle of substantially 90°, ***but less than 90°,*** with an inner surface of such ceramic tube. It is respectfully submitted that the three cited references teach or suggest an angle of 90 degrees which is different than the refined recital of Claim 1.

Stegmüller discloses a switch chamber for a vacuum switch including a housing composed of a cylindrical ceramic insulating tube. A relatively stiff cover 4 (Figure 2) results in high mechanical stress peaks at individual locations within cylindrical ceramic tube 5 and at the solder connection between cover 4 and cylindrical ceramic tube 5. A cover 14a (Figure 3) forms the connection between cylindrical ceramic tube 5 and contact pin 3 by way of an inner portion in the form of a bellows-type cylinder 21. An elastic disc 28 (Figure 5) may be provided in a supporting member 9 to absorb mechanical shocks caused by the housing when it springs back.

Sinnecker discloses (Figures 1 and 2) a vacuum switching tube 10 in the vicinity of its upper end which is connected to a head piece 7. A metal cap 26 is soldered to the upper annular end of a hollow cylindrical ceramic insulator 25 at the upper end of the vacuum switching tube 10.

Siemens AG (Figure 1) shows a beveled cylindrical tubular structure 2 abutting an L-shaped structure 3 in which the cylindrical tubular structure 2 has a bevel on an outer side thereof.

Claim 1 recites a ceramic tube for use in a vacuum circuit breaker, the ceramic tube being cylindrical in shape with a set length and a set internal diameter, with a cylindrical

end face at each end of the cylinder shape, each cylindrical end face being structured to be secured in a vacuum-tight manner to a metal end cap to form a vacuum chamber, characterized in that the cylindrical end face is shaped in such a manner that, in the assembled state, it makes contact with the metal end cap at least as far as the internal diameter of the ceramic tube in order to prevent, in operation of the vacuum circuit breaker, a concentration of electrical field at the triple junction of metal end cap, ceramic tube and vacuum chamber, wherein the cylindrical end face on an inner side of the ceramic tube forms an angle of substantially 90°, but less than 90°, with an inner surface of the ceramic tube.

The ceramic tube 5 of Stegmüller and the ceramic tube 25 of Sinnecker are just that, tubes, which are clearly understood by one of ordinary skill in the art to be cylindrical structures wherein the surface thereof is traced by a straight line moving parallel to a fixed straight line and intersecting a fixed planar closed curve, such as a circle. The structure 2 of Siemens AG is also a cylindrical structure, except for a bevel that the inventor intentionally placed on the outer side of the cylindrical structure 2. However, the inner side of that cylindrical structure 2, as shown, has no such bevel and is normal to the end face of that cylindrical structure.

It is submitted that none of the references, whether taken alone or in combination, teaches or suggests a ceramic tube, wherein at the triple junction of metal end cap, ceramic tube and vacuum chamber, a cylindrical end face on an inner side of such ceramic tube forms an angle of substantially 90°, ***but less than 90°***, with an inner surface of such ceramic tube. This is especially true where it is known that prior ceramic tubes employ bevels that clearly make the angle of exactly 90° actually be greater than 90°.<sup>2</sup>

Each of the references, taken as a whole, teaches or suggests to one of ordinary skill in the art an angle equal to 90° between a cylindrical end face and an inner surface of a cylindrical ceramic tube. Thus, the references clearly do not anticipate Claim 1 under Section 102(b). Furthermore, one of ordinary skill in the art would clearly be motivated to avoid the refined recital of Claim 1 for reasons of increased manufacturing cost as is discussed in the present specification. Hence, it is respectfully submitted that the Examiner reaches the conclusion of obviousness through the use of hindsight, which is clearly improper. See MPEP § 2142.

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<sup>2</sup> This point was dealt with in detail in the Amendment filed on September 13, 2005, at page 7, second paragraph, though page 8, fourth paragraph. Regardless, the “straight edges” of the ceramic tubes disclosed by the three cited references make clear that the angle is 90° or larger and cannot be less than 90°.

In view of the above, it is submitted that the skilled artisan having knowledge of the prior art will find no motivation whatsoever in any of the references of record to provide the solution according to Claim 1. Indeed, the skilled artisan would be motivated to provide any of the solutions offered in the references, which are different from the refined recital of Claim 1. The references do not teach or suggest a ceramic tube wherein the cylindrical end face on an inner side of the ceramic tube forms an angle of substantially  $90^\circ$ , **but less than  $90^\circ$** , with an inner surface of the ceramic tube. Therefore, Claim 1 patentably distinguishes over the references.

Claim 4 depends from Claim 1 and patentably distinguishes over the references for at least the same reasons.

Reconsideration and early allowance are requested.

Respectfully submitted,



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**Amendments to the Drawings:**

The attached replacement sheets of drawings are for Figures 1 and 2.

Attachment: Two (2) Replacement Sheets